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Call For Tender Documents

Technical Summary -TC-DS SRO Valve skids Qualification, Fabrication & Supply

The ITER Organisation (IO) intends to issue a call for tender for the component selection and qualification, manufacturing design, fabrication and supply of the Tokamak Complex Detritiation System (TC-DS) Valve Skids for the Start of Research Operations (SRO) operating phase.

This document provides a summary of the work scope, the technical requirements and the required Contractor experience and competencies.

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TECHNICAL SUMMARY

Call For Tender IO/26/10034218/JPK

TC-DS SRO Valve Skids Qualification, Fabrication & Supply

1 PURPOSE

The ITER Organisation (IO) intends to issue a call for tender for the component selection and qualification, manufacturing design, fabrication and supply of the Tokamak Complex Detritiation System (TC-DS) Valve Skids for the Start of Research Operations (SRO) operating phase.

This document provides a summary of the work scope, the technical requirements and the required Contractor experience and competencies.

2 BACKGROUND

ITER is a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power. The ITER fuel is a mixture of deuterium and tritium requiring measures necessary for the confinement and safe handling of tritium.

The ITER Tokamak Complex Detritiation System (TC-DS) removes tritium from effluent gases so that they can be safely released to atmosphere. The TC-DS Piping Network connects to client systems and rooms through an extensive piping network that controls, filters and monitors the flow from these clients. The valves, filters and instruments are mounted on Skids that are prefabricated, assembled and tested prior to delivery to the site to facilitate installation.

3 Description of SRO Valve Skids

3.1 Overview

The TC-DS Piping Network is an extensive piping system which connects to client systems and performs the following functions:

- Connecting and isolating of clients using actuated valves
- Control of the pressure in rooms by modulating the flow rate using active control valves
- Filter the gases using HEPA filters

The valves, instruments and filters that perform these functions are located on Valve Skids, which are described in the following sections.

3.2 Types of Valve Skids

There are different types of SRO Valves Skids as described in the following sections.

3.2.1 Port Cell Skids

There are twenty-three (23) Port Cell Skids, located in the Tokamak Building (B11) galleries. The Port Cell Skids include actuated isolation valves, pre-set flow control valves and manual valves as shown in the following schematic:

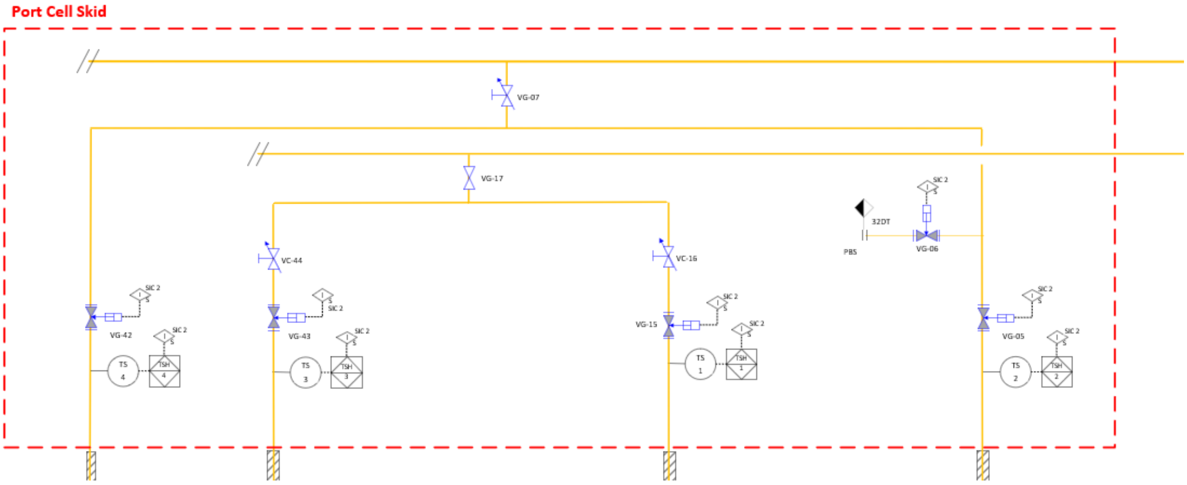

Figure 1: Schematic of typical Port Cell Skid configuration

The components are mounted on a carbon steel skid frame of dimensions (approx.) 2m x 1m x 0.65m (height). The Skids are fixed to the ceiling, connected by welding each Skid to two embedded plates. The PC Skids are connected to the inlet and outlet piping with flanges or with welded connections as shown in Figure 2.

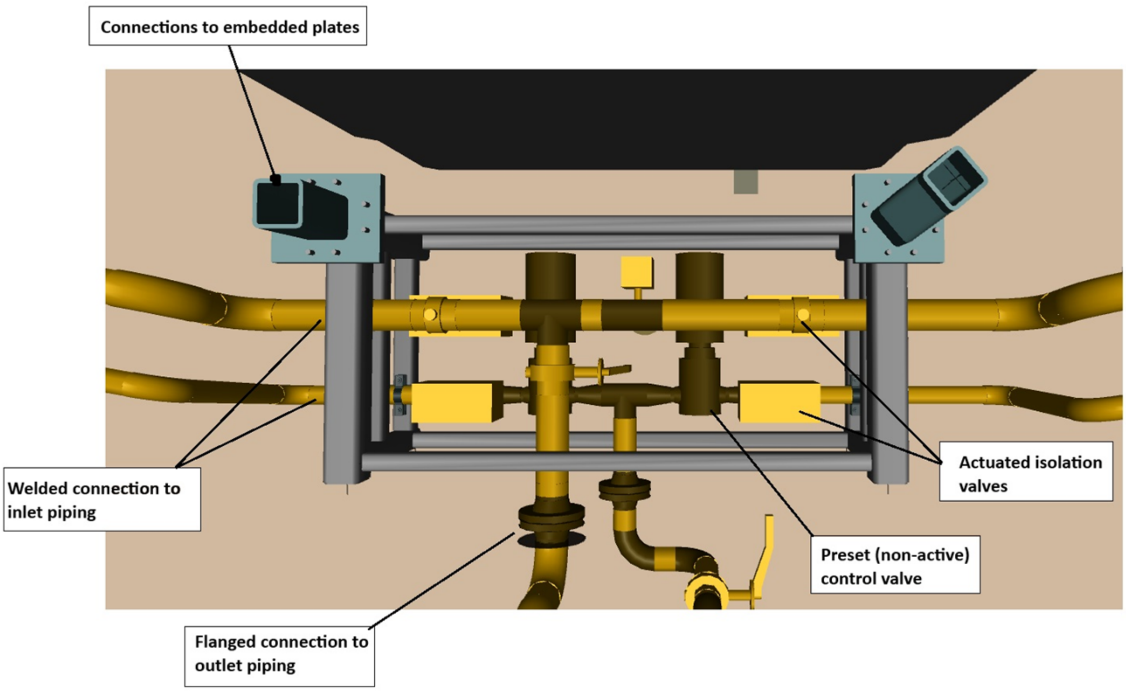

Figure 2: Illustration of typical Port Cell configuration (view from ceiling)

The Port Cell Skids are protected with Passive Fire Protection (PFP) to ensure that the valves maintain their isolation function and the Skid frame maintains structural integrity in the event of a fire in the rooms where the Skids are located. The PFP is represented by space reservation in Figure 3. The qualification, specification and selection of the PFP is performed by the IO and is not in the Contractor scope.

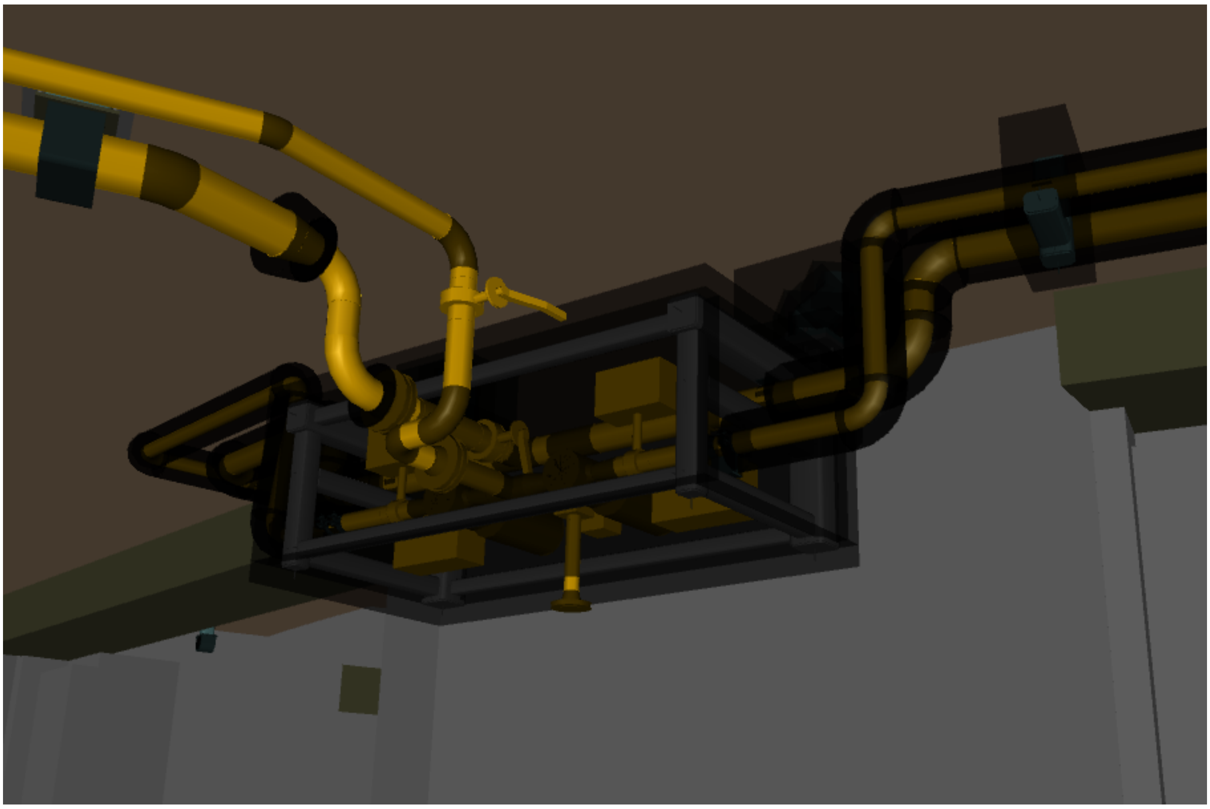

Figure 3: Illustration of Port Cell Skid with Passive Fire Protection Insulation

The main components (actuated valves, pre-set control valve and manual valves) are the same for all Port Cell Skids. There are some differences in the Port Cell Skids in terms of:

- Location of embedded plates relative to the Skid
- Position and connection type (i.e. flanged or welded) of the inlet and outline lines
- For some Port Cell Skids there are additional isolation and flow balancing valves.

3.2.2 Air Supply Line Skids

There are nineteen (19) Air Supply Line (ASL) Skids, located in the Tokamak Building (B11) galleries. The ASL Skids include actuated valves, motorised throttle valves, non-return valves and pressure indicators as shown in Figure 4.

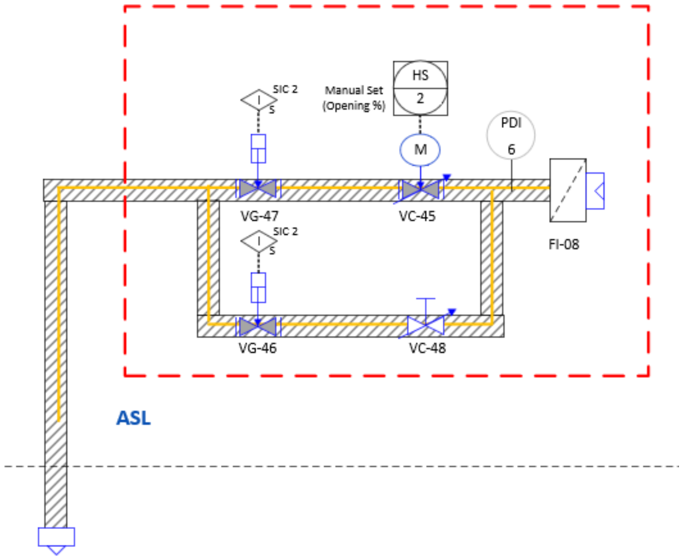

Figure 4: Schematic of typical ASL Skid configuration

The ASL Skids are mounted on carbon steel support structures that are mounted on the ceiling by welding to two embedded plates. The ASL Skids are connected to the inlet and outlet piping with welded connections.

The ASL Skids are protected with Passive Fire Protection (PFP) to ensure that the valves maintain their isolation function and the Skid frame maintains structural integrity in the event of a fire in the rooms where the Skids are located. Note that the qualification, specification and selection of the PFP is performed by the IO and is not in the Contractor scope.

The main components (actuated valves, pre-set control valve and motorised valves) are the same for all ASL Skids. There are some differences in the ASL Skids in terms of:

- Location of embedded plates relative to the Skid
- Position of the connecting lines.

3.2.3 Filter Skids

There are sixteen (16) HEPA filters that will be installed on Filter Skids in the Tokamak Building (B11) galleries. The Filter Skids include HEPA filters, actuated isolation valves, pre-set control valves, manual valves and instrumentation as shown in Figure 5.

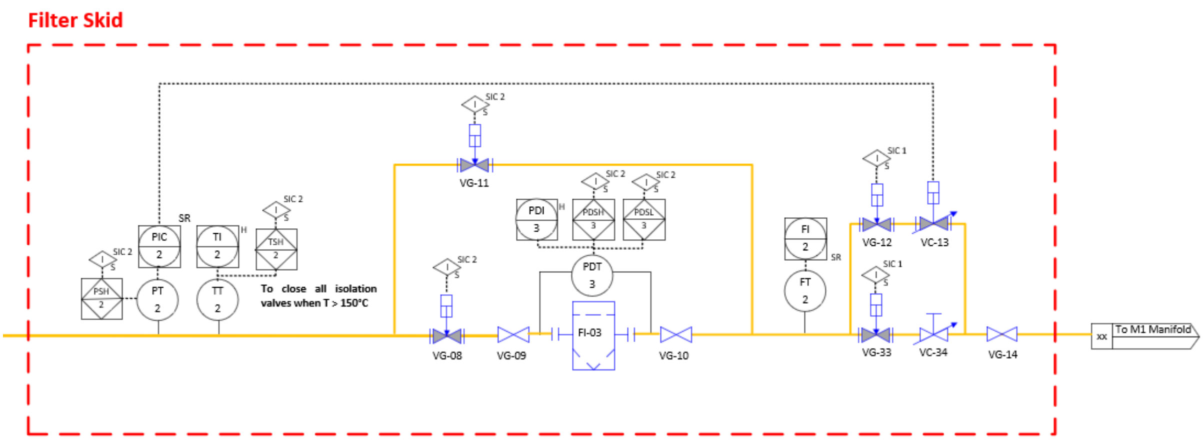

Figure 5: Schematic of typical Filter Skid Configuration

There are different configurations of the Filter Skids, some with only one HEPA filter and others with up to three HEPA filters. The Filter Skids are connected to embedded plates in the floor and walls. The Filter Skids are connected to the inlet and outlet piping with welded or flanged connections. Typical configurations are shown in Figure 6.

Figure 6: Illustration of typical Filter Skid configurations

Some of the lines and components on the Filter Skids are protected with Passive Fire Protection (PFP). The qualification, specification and selection of the PFP is performed by the IO and is not in the Contractor scope.

3.3 Equipment location and layout

The Skids will be installed by the IO in the Tokamak Building (B11). These buildings have already been constructed and an access path remain open for installation. The piping that connects to the Skids has already been installed.

3.4 Components & Materials Description

3.4.1 Piping

The main material of construction is stainless steel. The piping is seamless ASTM A312 TP304L. The fittings (elbows, tees etc.) are seamless ASTM A403 WP304L. Flanges are ASTM A182 F304L. Pipe sizes range from DN25 to DN200.

3.4.2 Structural steel

The structural members for the Skid frames are in hollow structural sections hot formed to EN 10210, painted with a 3-layer epoxy coating to provide corrosion protection and to allow for decontamination.

3.4.3 Instrumentation

Industry standard instruments for measurement of process parameters such as pressure, temperature and flow shall be used. Instruments classified as PIC will need to be qualified according to the relevant nuclear standards and for the environmental condition where they are located.

3.4.4 HEPA Filters

HEPA filters are fibre glass CTHEN qualified fire-proof for 2 hours at 270 degC, with filtration efficiency 99.95% for the most penetrating particle size, corresponding to ISO 35H class or high according to ISO

29463-1. The filter cartridge shall be housed in a stainless-steel filter casing designed to ASME BPVC Section VIII. The design of the housing and Skid shall be designed for contamination free bag in / bag out filter element change.

3.5 Loose items

In addition to the Valve Skids, the Contractor shall qualify, procure and supply loose items (namely valves and filters) that will be installed by the IO.

3.6 Environmental conditions

The equipment will be installed and will operate inside the Tokamak Building. The conditions of seismic loading, ionizing radiation or magnetic fields are specified in the Technical Specification.

4 Technical Requirements

4.1 Classifications

4.1.1 Safety Classification

The TC-DS SRO Valve Skids perform the following nuclear safety functions in normal and accident conditions:

- Confinement of radioactive gases
- Operation of the actuated isolation valves to ensure the dynamic confinement function and fire sectorisation is maintained
- Filtration of the gases.

The components in the Valve Skids that contribute to the nuclear safety functions are classified as Protection Important Components (PIC) and consequently need to comply with the French Order of 7th February 2012, which establishes the general rules for licenced nuclear installations in France. PIC components will need to be qualified to demonstrate that they perform their nuclear safety function in all normal and accident conditions.

4.1.2 Quality Class

The equipment and components that perform nuclear safety functions are assigned the highest quality class (Quality Class 1) under the ITER quality classification system. These components require strict quality controls to ensure and demonstrate that they are designed and manufactured in accordance with the technical requirements.

4.1.3 Seismic Class

The PIC components shall be designed and qualified to ensure they perform their nuclear safety functions during a design basis seismic event. This qualification shall be demonstrated through testing or analysis. The supports and structure shall also be qualified to remain structurally sound and ensure no collapse or damage to the primary confinement barrier in seismic events.

4.1.4 Pressure Equipment Directive

The equipment in the scope of work is classified as Sound Engineering Practice (SEP) under the Pressure Equipment Directive 2014/68/EU.

4.1.5 French Nuclear Pressure Equipment Regulations

The equipment in the scope of work does not fall under French nuclear equipment regulations (French ESPN Order).

4.2 Applicable codes and standards

The main applicable codes are listed in Table 1.

Table 1: Design codes / standards used

Equipment type	Applicable design codes
Piping	ASME B31.3
Filter Casing	ASME BPVC section VIII
Support structures and platforms	Eurocodes
Instrumentation & Control	IEC 61513 for PIC IEC 61508 for non-PIC

5 Scope of Work

The Scope of Work is to select components based on the IO specifications, integrate them into the design of the Skids, qualify the components to demonstrate that they perform their nuclear safety function in normal and accident conditions, procure the equipment, fabricate and test the Skids and deliver to the ITER site for installation by others.

The Scope of Work is further described in the following sections.

5.1 Component Selection

The IO has performed the process design of the Skids and specified all the components including the valves, instruments, filters and piping. The Contractor shall select the components based on the IO specifications.

5.2 Detailed Design

The Contractor shall integrate the selected components into the Skid design, considering requirements for operability and maintainability as well as integration with the building environment. The Contractor shall perform a scan of the installation locations to determine the precise coordinates of the connecting piping (which is already installed) and the embedded plates. The Contractor shall also provide a methodology for the installation of the Skids.

The Contractor shall perform the design of the Skid frame and perform structural analysis of the frame and piping to verify that the components are sufficiently supported and nozzle loads on the filter housing and stresses are within acceptable limits in all load conditions.

5.3 Equipment qualification

As described in Section 4.1.1, components that are classified as PIC need to be qualified to demonstrate that they can perform their safety functions under normal and accident conditions. The IO will identify the PIC components, their safety functions and the applicable normal and accident conditions in the Technical Specification.

The Contractor shall select suitable components, develop the qualification strategy for each component, perform the qualification activities and prepare the qualification documentation. Qualification methods shall be based on RCCE (for electrical components) and RCCM (for mechanical components) standards. IO will include further guidance on acceptable qualification approaches within subsequent tender information.

The components will need to be qualified for the following:

- Seismic loading – this may be by test or by calculation (i.e. for piping and structures)
- Static magnetic field up to 84mT

- Radiation exposure generally up to 10kGy (for a few components, potentially higher up to 1000 kGy)

5.4 Manufacturing Design, Procurement and fabrication

Following the detailed design and completion of equipment qualification activities, the Contractor shall procure the components and perform the manufacturing design. After review of the manufacturing design by the IO at the Manufacturing Readiness Review, the Contractor shall assemble the components and fabricate the Skids. This will culminate in factory acceptance testing at the Contractor (or subcontractor) premises.

5.5 Delivery

The Contractor shall deliver the equipment to the ITER site for installation (or storage if it cannot be installed immediately). The Equipment shall be delivered to the ITER site, Cadarache, France.

6 Contracting Schedule

The Contract is scheduled to come into effect in May of 2026. The tentative timetable is as follows:

Call for Nomination Release	10 Jan 2026
Issuance of Pre-qualification Application	10 Feb 2026
Issuance of Call for Tender	1 April 2026
Tender evaluation	15 May 2026
Contract signature	31 May 2026

7 Experience

The successful selected Contractor and its personnel shall possess technical and engineering expertise and experience in:

- The successful planning, execution and project management of small to medium scale EPC type projects
- Detailed design and fabrication of equipment skids
- Engineering design, analysis and preparation of technical documentation in the areas of process, mechanical, piping, structural, electrical and I&C engineering for process systems on a nuclear licensed facility
- Quality assurance and quality control for design, procurement and fabrication of equipment and components for nuclear applications
- Qualification of equipment and components for nuclear safety applications.

8 Nuclear and Quality Requirements

ITER is a Nuclear Facility identified in France by the number INB-174 (Installation Nucléaire de Base (INB)).

TC-DS performs nuclear safety functions. It is therefore classified under the French Order of 7th February 2012 (which establishes the general rules for licenced nuclear installations) as a system consisting of PIC components. Activities that have an impact on the ability of these components to perform their nuclear safety functions are defined as Protection Important Activities (PIA) under this Order. The Contractor is informed that:

- The Order 7th February 2012 applies to all PIC components and PIA activities
- Compliance with the INB-order must be demonstrated throughout the chain of sub-contractors
- In application of article II.2.5.4 of the Order 7th February 2012, contracted activities are subject to supervision by the Nuclear Operator (i.e. the IO).

The Contractor shall implement a quality assurance programme and shall demonstrate that it is compliant with the IO quality management requirements, in particular for the application of the INB Order.

9 Candidature

Participation is open to all legal entities participating either individually or in a grouping/consortium. A legal entity is an individual, company, or organization that has legal rights and obligations and is established within an ITER Member State, being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA.

Legal entities cannot participate individually or as a consortium partner in more than one application or tender of the same contract. A consortium may be a permanent, legally established grouping, or a grouping which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

In order for a consortium to be acceptable, the individual legal entities included therein shall have nominated a consortium leader with authority to bind each member of the consortium, and this leader shall be authorised to incur liabilities and receive instructions for and on behalf of each member of the consortium.

It is expected that the designated consortium leader will explain the composition of the consortium members in its offer. Following this, the Candidate's composition must not be modified without notifying the ITER Organization of any change. Evidence of any such authorisation to represent and bind each consortium member shall be submitted to the IO in due course in the form of a power of attorney signed by legally authorised signatories of all the consortium members.

Any consortium member shall be registered in IPROC.

10 Cost Range

This scope of work is identified at Cost Range C which is between 1 500 000 - 5 000 000 EUR.

11 Sub-contracting Rules

All sub-contractors who will be taken on by the Contractor shall be declared together with the tender submission. Each sub-contractor will be required to complete and sign forms including technical and administrative information which shall be submitted to the IO by the tenderer as part of its tender.

The IO reserves the right to approve any sub-contractor which was not notified in the tender and request a copy of the sub-contracting agreement between the tenderer and its sub-contractor(s).

Sub-contracting is allowed but it is limited to one level and its cumulated volume is limited to 40% of the total Contract value.